CONTENTS

VOLUME 21

NUMBER 1 — MARCH 1986

M. Hyman and M.W. Rowe: Saturation Magnetization Measurements of Carbonaceous Chondrites 1
E.R. Rambaldi, R.S. Rajan, R.M. Housley, and D. Wang: Gallium-Bearing Sphalerite in a Metal-Sulfide Nodule of the Qingzhen (EH3) Chondrite 23
John W. Shervais, Lawrence A. Taylor, Eun-Hee Cirlin, Eugene Jarosewich, and J.C. Laul: The Maryville Meteorite: A 1983 Fall of an L6 Chondrite 33
Vagn Fabritius Buchwald: Jerslev, the First Iron Meteorite from Denmark 47
Masako Shima, Sadao Murayama, Fumitaka Wakabayashi, Akihiko Okada, and Hideo Yabuki: Two New Chondrite-Falls in Japan 59
A.J. Easton: Studies of Kamacite, Perryite and Schreibersite in E-Chondrites and Aubrites 79
Dieter Heymann and K. Liffman: Isotopic Compositions of Bismuth, Lead, Thallium, and Mercury from Mini *r*-Processing 95
Takafumi Matsui, Naoji Sugiura, and N.S. Brar: Gas Permeability of Shocked Chondrites 109
Wang-Hong Yang, R. James Kirkpatrick, Norma Vergo, John McHone, Tryggvi E. Emilsson, and Eric Oldfield: Detection of High-Pressure Silica Polymorphs in Whole-Rock Samples from a Meteor Crater, Arizona, Impact Sample using Solid-State Silicon-29 Nuclear Magnetic Resonance Spectroscopy 117
Klaus Kail, G.H. Conrad, E.A. King, and Alfredo San Miguel: Petrology and Classification of the Garraf, Spain Chondrite 125
Brian Mason: The Classification of the Benares Chondrite 131
C.L. Smith and J.R. De Laeter: The Isotopic Composition of Tellurium in the Abee Meteorite 133
E.R. Rambaldi, R.S. Rajan, and R.M. Housley: Roedderite in the Qingzhen (EH3) Chondrite 141
Abstracts of Papers Published in Meteoritika 151
Miscellanea 157

NUMBER 2 — JUNE 1986

K. Fredriksson, B.J. Fredriksson, and F. Kraut: The Hedjaz Meteorite 159
John L. Berkley: Four Antarctic Ureilites: Petrology and Observations on Ureilite Petrogenisis 169

Howard Axon: A Note on Widmanstätten Crystallography 191
Elbert A. King, Alfredo San Miguel, Ignacio Casanova, and Klaus Keil: Inventory of the Meteorite Collection of the Museo Nacional de Ciencias Naturales, C.S.I.C., Madrid, Spain 193
B.Yu. Levin and V.A. Bronshten: The Tunguska Event and the Meteors with Terminal Flares 199
S.I. Recca, E.R.D. Scott, K. Keil, R.N. Clayton, T.K. Mayeda, G.I Huss, E. Jarosewich, K.S. Weeks, F.A. Hasan, D.W.G. Sears, R. Wieler, and P. Signer: Ragland, an LL3.4 Chondrite Find from New Mexico 217
Abstracts of Papers published in Meteoritika 231
In Memory of Harvey Harlow Nininger 239
Miscellanea 241

NUMBER 3 — SEPTEMBER 1986

J.C. Evans, J.H. Reeves, and D.D. Bogard: Cosmogenic Radionuclides and Noble Gases in the Wethersfield (1982) Chondrite 243
William F. Read: Possible Impact Spherules from Near the Base of the Middle Ordovician in Northern Illinois 251
W.H. Cleverly, Eugene Jarosewich, and Brian Mason: Camel Donga Meteorite, a New Eucrite from the Nullarbor Plain, Western Australia 263
Gregory S. Ridenour: Evidence for Selective Volatilization and Imperfect Mixing in Indochinites 271
Alan E. Rubin: Elemental Compositions of Major Silicic Phases in Chondrules of Unequilibrated Chondritic Meteorites 283
J.C. Bailey: Fluorine and Chlorine Contents of Tektites 295
Edward R.D. Scott, Susan G. McKinley, Klaus Keil, and Ivan E. Wilson: Recovery and Classification of Thirty New Meteorites from Roosevelt County, New Mexico 303
The Meteoritical Bulletin 309
David L. Cocke and M.W. Rowe: Note: Plasma Chemistry of Meteorites — I. Cleansing and Reduction of the Odessa Iron Meteorite 315
Miscellanea 319
Erratum 321

NUMBER 4 — DECEMBER 1986

Presentation of the 1986 Leonard Medal 323
Award of the Barringer Medal 325

Abstracts

C. Alexander, D.J. Barber, and R. Hutchison: Hydrous Phases and Hydrous Alteration in U.O.C.s 328
D. Aylmer, G.F. Herzog, J. Klein, and R. Middleton: Beryllium-10 Contents of Eucrites 329
Ralph B. Baldwin: A Determination of the Absolute Ages of Seven Front Face Lunar Basins 329
D.J. Barber and K. Yanai: An Investigation of the Unusual Carbonaceous Yamato 82042 by Transmission Electron Microscopy 330
R.H. Becker, R.O. Pepin, R.S. Rajan, and E.R. Rambaldi: Light Noble Gases in Weston Metal Grain Surfaces 331
J.R. Beckett, L. Grossman, and S.E. Haggerty: Origin of Ti^{3+}-Bearing Rhönite in Ca-, Al-Rich Inclusions: An Experimental Study 332
J.F. Bell: Mineralogical Evolution of the Asteroid Belt 333
John L. Berkley: Implications of Fabric Relations in the ALH 82130 Ureilite 334
A.W.R. Bevan and R.A. Binns: A Preliminary Sorting Out of New Meteorite Recoveries from the Nullarbor Plain, Western Australia 335
J.-P. Bibring and Y. Langevin: The Primitive Cometary Matter 336
N.Z. Boctor and A. El Goresy: Metal-Sulfide Assemblage in Saint Marks EH5 Chondrite 336
Donald Bogard and Fred Hörz: Shock-Implanted Noble Gases: An Experimental Study with Implications for the Origin of Martian Gases in Shergottite Meteorites 337
G.H. Bowen and L.A. Willson: Large Early Solar Mass Loss — 1. Solar System Evolution 338
J.P. Bradley and D.E. Brownlee: Analytical Electron Microscopy of Thin-Sectioned Interplanetary Dust Particles (IDP's) 339
Daniel T. Britt, Carle M. Pieters, and Peter H. Schultz: Source of the Optical Red-Slope in Iron-Rich Meteorites 340
P.Z. Budka and F.F. Milillo: The Inverse Peritectic Phase Transformation in the Fe-S System: Evidence for the Remelting of Troilite During Cooling 342
P.Z. Budka and F.F. Milillo: Some Common Microstructural Features of Nickel-Iron Meteorites and Cast Ferrous Alloys 342
Ray Burgess, I.P. Wright, and C.T. Pillinger: A Record of Sulphur-34 Depletion in C3, C4 and C5 Chondrites 343
R.H. Carr, E.K. Gibson, F.J.M. Rietmeijer, M.M. Grady, I.P. Wright, and C.T. Pillinger: Characterization of Carbonaceous Materials in Interplanetary Dust Particlese 344
Clark R. Chapman: Do Observations of Hirayama Families Tell Us About Parent-Body Interiors? 345
R.N. Clayton, T.K. Mayeda, and J.N. Goswami: Oxygen and Silicon Isotopic Variations in Chondrules 346
B. Corner and W.U. Reimold: Aeromagnetic and Gravity Interpretation of the Southern Portion of the Kaapvaal Craton with Special Reference to the Relationship Between the Witwatersrand Basin and the Vredefort Dome 347
J. Danon, M. Funaki, T. Nagata, and I. Souza Azevedo: Mössbauer Spectrum and Magnetic Properties of the Olivenza Chondrite 349
Andrew M. Davis, Glenn J. MacPherson, and Richard W. Hinton: Rims Revealed — Ion Microprobe Analysis of Individual Rim Layers in a Vigarano Type A Inclusion 349

Jeremy S. Delaney, M. Prinz, S. Sutton, and J.V. Smith:
Chalcophile and Siderophile Behavior of Cu and Its Effect
on the Composition of Iron Meteorites 351
Jeremy S. Delaney: A Provincial Model for the
Crust of a Basaltic Achondrite Planetoid 352
J.E. Dennison, P.W. Kaczaral, and M.E. Lipschutz:
Volatile/Mobile Chalcophile, Siderophile and
Lithophile Trace Elements in Lunar Meteorites 353
A. Deutsch, B. Quandt, and U. Hornemann: The Response of the
Sr Isotopic System in Geological Samples to Artificial Shock Pressure 354
Robert S. Dietz: Triassic-Jurassic Extinction Event,
Newark Basalts and Impact-Generated Bahama Nexxus 355
Michael J. Drake and William V. Boynton: Partitioning of REE
Between Hibonite and Melt and Implications for
Nebular Condensation of the REE 356
Misuru Ebihara: Distribution of Rare Earth Elements
in Unequilibrated Ordinary Chondrites 357
P. Englert: Cosmogenic Radionuclide Studies
in the Chondritic Breccia Djermaia 358
O. Eugster, Ch. Shen, J. Beer, M. Suter, W. Wölfli, W. Yi, and D. Wang:
Exposure Ages of Five Meteorites from China and
^{81}Kr-Kr Based Noble Gas Production Rates 359
Albert Fahey, Ernst Zinner, and Gero Kurat: Anomalous Ca and Ti
in a Hercynite-Hibonite Inclusion from Lance 359
Bruce Fegley, Jr.: Formation of Dust Grains in Cool Stellar
Atmospheres: Thermochemical Kinetic Models 361
E.L. Fireman: Uranium-Series Study of Ice
Near the Bottom of the Byrd Core 362
G.J. Flynn: Effects of Orbital Evolution
on Encounter Velocity and Exposure Age of IDPs 362
Carl A. Francis and Ursula B. Marvin: Implications of Sampling
for the Origin of Noble Gases in the Washington County Iron Meteorite 363
K. Fredriksson: Experiments on Melting, Solidification
and Crystallization of Chondritic Components 364
Michael J. Gaffey: Evolution of the Inner Asteroid Belt:
Paradigms and Paradoxes from Spectral Studies 365
James B. Garvin and Herbert W. Blodget:
Suspected Impact Crater Near Al Madafi, Saudi Arabia 366
James B. Garvin: Large Format Camera Images
of Australian Impact Craters 367
Donald E. Gault and Peter H. Schultz: Oblique Impact:
Projectile Ricochet, Concomitant Ejecta, and Momentum Transfer 368
B.P. Glass, D.W. Muenow, and K.E. Aggrey:
Further Evidence for the Impact Origin of Tektites 369
J.I. Goldstein: Metallographic Cooling Rates — Recent Advances 370
C.A. Goodrich: The Physical Setting of Ureilite Formation 371
Cyrena A. Goodrich: Y74130: A Ureilite with Cumulus Augite 373
J.N. Goswami and N. Sinha: Solar Flare Track Records
in Fayetteville Gas-Rich Chondrite 375
Monica M. Grady and C.T. Pillinger: The ALHA 82130 Ureilite:
Its Light Element Stable Isotope Composition and
Relationship to Other Ureilites 375

Th. Graf, P. Signer, and R. Wieler: Production Rates of Light Noble Gases, ^{10}Be and ^{26}Al in Chondrites 376
A.L. Graham and G.I Huss: The Julesburg, Colorado, Meteorite, A New L3 Find 378
Jeffrey N. Grossman and John T. Wasson: Distribution of Volatiles, Siderophiles and Chalcophiles Between the Rims and Interiors of Semarkona Chondrules 378
L. Grossman, A. Hashimoto, and R.W. Hinton: Phyllosilicate Inside Amoeboid Olivine Aggregates in Allende 379
R.K. Guimon, D.W.G. Sears, and G.E. Lofgren: Metamorphism Versus Aqueous Alteration in Type 3.0-3.3 Ordinary Chondrites 380
R.K. Guimon and D.W.G. Sears: Thermoluminescence and Metamorphism of Allende and Its CAI 381
Peter Gundel, V.F. Buchwald, T. Kjer, and K.A. Thorsen: Thermal Migration II: Small Temperature Gradients 383
Jerome Halbout and Francois Robert: Numerical Simulations of Stable Isotope Results of Progressive Heating Experiments 384
Munir Hag, Fouad A. Hasan, and Derek W.G. Sears: Thermoluminescence and the Origin of the Dark Matrix of Fayetteville and Similar Meteorites 387
Christopher P. Hartmetz and Derek W.G. Sears: Thermoluminescence Studies of Annealed Plagioclase Feldspars 388
Fouad A. Hasan, Munir Haq, and Derek W.G. Sears: The Natural Thermoluminescence of Antarctic Meterorites and Its Relationship with Al-26 Content 390
A. Hashimoto and J.A. Wood: Enhanced Volatility of CaO in H_2O-Rich Gas Environments as a Factor in the Alteration of Ca,Al-Rich Inclusions 391
A. Havette and J.C. Lorin: Isotopic Composition of Potassium in Ca-Al Rich Inclusions of Allende and Leoville 392
B.R. Hawke, J.F. Bell, P.G. Lucey, C.R. Coombs, C.M. Pieters, R. Jaumann, and G. Neukum: Spectral Studies of the Tycho Region of the Moon . . 393
U. Herpers, S. Vogt, G. Bonani, M. Suter, and W. Wölfli: Determination of Cosmic Ray Produced ^{10}Be and ^{26}Al in Frontier Mountain Chondrites by Accelerator Mass Spectroscopy with Respect to Irradiation History and Terrestrial Ages 394
Richard Hervig, Jeremy Delaney, and Carol O'Neill: Evidence for Partial Remelting of Stannern and Comparison with a Silica-Bearing Clast in Juvinas 395
Roger H. Hewins: Serial Melting or Magma Ocean for the HED Achondrites? 396
Richard W. Hinton and Andrew M. Davis: Partitioning of the Rare Earth Elements Among the Phases of a Coarse-Grained Allende Inclusion 397
Britt A. Holmén and John A. Wood: Chondrules That Indent One Another: Evidence for Hot Accretion? 399
R.M. Housley: On the Relationship Between CAI Evolution and Chondrule Formation 400
Glenn I Huss: Observations on the Atmospheric Disruption of Meteoritic Bodies 400
Gary R. Huss: Lack of Conclusive Evidence for Life ^{26}Al in the Early Solar System . . . 401
R. Hutchison, C.T. Williams, V.K. Din, R.L. Paul, and M.E. Lipschutz: An Achondritic Troctolite Clast in the Barwell, L5-6, Chondrite 402
M. Hutson: A Search for Chemical Clusters in H- and L-Chondrites 403
T. Ireland, A. Fahey, K. McKeegan, and E. Zinner: A Zoo of REE Patterns in Murchison Hibonites 404

L. Jansa, B. Robertson, and G. Pe-Piper:
Montagnais; the First Discovery of a Submarine Impact Structure 406
Eric A. Jerde and Alan E. Rubin: Diverse Eucritic Pebbles in the
Vaca Muerta Mesosiderite: Una Manada de Las Muertas 406
J.H. Jones and D.J. Malvin: A Nonmetal-Avoidance Model
for Metal-Nonmetal Interactions in Metallic Liquids 407
S. Jovanovic and G.W. Reed, Jr.: Hg Geothermometry: Further Applications 409
Gregory W. Kallemeyn: A Compositional Study of the Ungrouped Y793495
Carbonaceous Chondrite and Several CM Chondrites from Antarctica 410
T. Kato, Y. Miúra, and K. Yanai: Osumilite Composition
in Various Chondritic Meteorites 410
Bradly D. Keck and Derek W.G. Sears: Cathodoluminescence of the CO Chondrites . . . 411
T.V.V. King and R.N. Clark: Spectral Characteristics of Serpentines
and Chlorites Using High Resolution Reflectance Spectroscopy 412
M. Kirchmayer and F. Wlotzka: Fabric Statistics of Chondrules,
Metal Grains, Clasts and CAI's in Chondrites 413
C. Kirschbaum: Iodine-Xenon and ^{40}Ar-^{39}Ar Dating
of an Unusual Inclusion from the Barwell Meteorite 414
J. Kissel, D.E. Brownlee, K. Büchler, B.C. Clark, H. Fechtig, E. Grün,
K. Hornung, E.B. Igenbergs, E.K. Jessberger, F.R. Krueger, H. Kuczera,
J.A.M. McDonnell, G.M. Morfill, J. Rahe, G.H. Schwehm,
Z. Sekanina, N.G. Utterback, H.J. Völk, and H.A. Zook:
A Preliminary Comparison of Halley Dust and Meteoritic Materials 416
S.A. Kissin: Application of the Sphalerite Cosmobarometer to the Enstatite Chondrites . 417
J. Klein, R. Middleton, D. Alymer, and G.F. Herzog:
^{26}Al Contents of Iron Meteorites 418
R. Knox, Jr.: Quantitative Metallography
of Zoned Taenite Grains in Ordinary Chondrites 419
Christian Koeberl and Wolfgang Kiesl: Lunar Meteorites Y-791197
and Y-82192: Geochemistry of Halogens and Other Trace Elements 420
Christian Koeberl and Billy P. Glass: Trace Elements in Tektite Fragments
and Microtektites from Deep Sea Drill Cores and Barbados:
Connection to the North American Strewn Field 421
Alan S. Kornacki and Bruce Fegley, Jr.: Fractionated Lithophile and
Siderophile Refractory Trace-Element Patterns in CAI's:
Implications for Grain Transport in the Solar Nebula 422
J.A. Kowalik, J.I. Goldstein, and D.B. Williams: Comparison of the
Lamellar Plessite Structure in Two Groups of
Iron Meteorites — Are They Related? 425
J. Kozul, G.C. Ulmer, and R.H. Hewins:
Intrinsic Oxygen Fugacities of Allende CAI's 425
A. Kracher and G.H. Bowen: Large Early Solar Mass Loss — 2.
Consequences for Meteorites 426
Frank T. Kyte and Lei Zhou: A Reevaluation of the Late Pliocene Event 427
Bruno Lang and Krzysztof Franaszczuk: Fractal Viewpoint
of Fragmentation of the Lowicz Meteorite 428
J.W. Larimer: Gas-Dust Fractionation:
Oxidation State and Siderophile Element Fractionation 429
J.W. Larimer and E.R. Rambaldi: Formation of Iron Meteorites:
Melting and Segregation of Metal in Parent Bodies 429
J.R. Laughlin, R.W. Hinton, L. Grossman, and A.M. Davis: Iron Microprobe Study
of Rim and Core Perovskite in an Allende Inclusion 430

J.C. Laul: Chemical Study of Fayetteville's Clasts and Matrix 432
G.R. Levi-Donati: Petrology of the Only One European
Recovered XVII Century Stone: -Vago 432
Roy S. Lewis and Wendy S. Wolbach: Search for Noble Gases at the K-T Boundary . . . 434
J.C. Lorin, A. havette, and G. Slodzian: ^{16}O, ^{17}O and ^{18}O Relative
Abundance in Individual Iron-Type Cosmic Spherules 435
Laura L. Lundberg, Ghislaine Crozaz, Ernst Zinner, and Gordon McKay:
The REE Carrieres in the Shergotty Meteorite 437
D. Lusby, E.R.D. Scott, and K. Keil: Origins of EH3 Chondrites:
Chondrules, Matrix and Brecciation 438
Glenn J. MacPherson, Richard W. Hinton, and Andrew M. Davis:
Petrology, Chemistry and Magnesium Isotope Systematics
of a Unique Allende Inclusion 439
Daniel J. Malvin, John H. Jones, and Michael J. Drake:
You Can Fit All of the Meteorites Some of the Time:
New Models of Iron Meteorite Fractional Crystallization 440
K. Marti and H. Craig: Cosmic Ray Records in Terrestrial Rocks 441
K. Marti and H.E. Suess: The Even-Odd Systematics
in R-Process Nuclide Abundances 442
Ursula B. Marvin: Components of Dust Bands in Ice
from Cul de Sac, Allan Hills Region, Antarctica 442
Brian Mason, Eugene Jarosewich, and W.H. Cleverly: Camel Donga,
a New Eucrite from the Nullarbor Plain, Western Australia 443
Elisabeth A. McFarlane and Bashar Rizk: Origin of the Moon
by Giant Impact: Constraints on the Composition of the Projectile 444
David W. McGarvie, I.P. Wright, M.M. Grady, and C.T. Pillinger:
The Distribution of ^{13}C-Rich Carbon in Carbonaceous Chondrites 445
John F. McHone, Michael L. Sargent, and W. John Nelson:
Shatter Cones in Illinois: Evidence for
Meteoritic Impacts at Glasford and Des Plaines 446
D.S. McKay and S.J. Wentworth: Ancient Lunar Glasses
As Clues to the Early Meteoroid Complex 447
G. McKay, L. Le, J. Wagstaff, and S.-R. Yang:
Whitlockite/Melt Partitioning and Shergotty Chronology 448
Kevin McKeegan, Ernst Zinner, and Michael Zolensky:
Ion Probe Measurements of O Isotopes in Refractory Stratospheric
Dust Particles: Proof of Extraterrestrial Origin 449
Harry Y. McSween, Jr.: Mass Balance Constraints on the
Matrix Mineralogy of Carbonaceous Chondrites 451
G.P. Meeker: Auger Microprobe Analysis of Primitive Solar System Materials 452
A. Ferling-Metzler, H.-J. Redeker, and D. Stöffler: Petrography,
Shock Metamorphism, Excavation and Uplift of the 1700m
Deep Crystalline Basement of Haughton Dome Crater, Canada 453
K. Metzler: Lithic Clasts in Polymict Achondritic Breccias 455
R. McG. Miller and W.U. Reimold: Deformation and Shock
Deformation in Rocks from the Roter Kamm Crater, SWA/Namibia 456
Tang Ming, Roy S. Lewis, Edward Anders, M.M. Grady, I.P. Wright,
and C.T. Pillinger: Presolar Components in the Murray
C2M Chondrites s-Process Xe and Heavy Carbon 458
David W. Mittlefehldt: Alkali Element Abundances in Achondrites
and Volatile Loss from Achondrite Parent Bodies 459

D.W. Mittlefehldt, L.E. Nyquist, B.M. Bansal, C.-Y. Shih, and H. Wiesmann: Petrogenesis of Type 1A Mesosiderite Silicates 460
Y. Miúra, H. Miura, and K. Yanai: Relation Between Mg-Value and An-Content of Plagioclase Composition in Chondritic Meteorites 460
Y. Miura, G. Shibuya, T. Abe, K. Abe, and T. Kato: Serpentine-Group Minerals in Carbonaceous Chondrites 462
Masamichi Miyamoto: Homogenization of Chemical Zoning of Barred Olivines in Ordinary Chondrites 463
Finn Ulff-Möller: A New 10 Tons Iron Boulder from Disko, West Greenland 464
C.B. Moore and C.F. Lewis: Total Carbon in Fayetteville Dark-Light Meteorites 465
L.G. Morales: Meteoritics in Peru 466
H. Mori, Hiroshi Takeda, and H. Toyoda: Mineralogy of Pigeonites from the Allan Hills 82106 Ureilite 466
N. Müller, T. Stephan, and E.K. Jessberger: Laser Probe and Stepwise Heating ^{40}Ar-^{39}Ar Ages of EH Chondrites Indarch and Yamato 691 467
C.E. Nehry, M.K. Weisberg, and M. Prinz: Chondrules in the Kakangari Chondrite 468
H.E. Newsom, K. Keil, and E.R.D. Scott: Dark Clasts with Variable REE Contents in the Khor Temiki Aubrite: Origin by Impact Blackening of Heterogeneous Target Material 469
S. Niemeyer: Ti Isotopic Anomalies in Orgueil and Constituents of CM and CV meteorites 470
K. Nishiizumi, J.R. Arnold, N. Goswami, J. Klein, and R. Middleton: Solar Cosmic Ray Effects in Allan Hills 77005 472
J.A. O'Keefe: Origin of Tektites 474
Steven C. Okulewicz and J.S. Delaney: Petrology of Lithic Clasts in the EET83212, 83227, and 83228 Polymict Eucrites 474
S.J. Ostro, D.K. Yeomans, R.F. Jurgens, and R.M. Goldstein: Radar Detection of Asteroid 1986 JK 475
S.J. Ostro, P. Tsou, and J.B. Stephens: Impact Cavities in Underdense Regoliths? 476
U. Ott, H.P. Löhr, and F. Begemann: Noble Gases in ALH 82130: Comparison with ALHA 78019 and Diamond-Bearing Ureilites 477
Xinwei Ouyang, Jianmin Wang, and John T. Wasson: Compositional Relationships between Iron Meteorite Groups IAB and IIICD 478
J.D. Padia and M.N. Rao: Neon Based Clues to the Activity of the Early Sun 479
H. Palme, F. Wlotzka, and B. Spettel: Camel Donga, a Eucrite with High Metal Content 480
R.L. Paul, R.M. Verkouteren, and M.E. Lipschutz: Volatile Trace Elements in Some Allan Hills Ureilites 481
P. Pellas: Onion-Shell Structure of the H-Asteroid: A Confirmation 482
R.O. Pepin: A Model for the Origin of Noble Gas Distributions in Meteorites and Planetary Atmospheres 483
H.N. Planner: Appearance of Metal at the Chondrule Surface During Chondrule Melting 484
T.M. Primus, C.B. Moore, and E.K. Gibson, Jr.: Sulfur Mobilization in Artificially Heated Allende 485
M. Prinz, M.K. Weisberg, C.E. Nehru, and J.S. Delaney: Layered Chondrules in Carbonaceous Chondrites 485
Richard N. Pugh and John E. Allen: Origin of the Willamette Meteorite 486
G.M. Raisbeck, F. Yiou, D. Bourles, and M. Maurette: ^{10}Be and ^{26}Al in Greenland Cosmic Spherules; Evidence for Irradiation in Space as Small Objects and a Probable Cometary Origin 487

M.N. Rao: Rare Gases in Shergotty Maskelynite 488
A.S.P. Rao: Origin of ALHA 81005: Another View 488
Robert C. Reedy: Cosmogenic Nuclide Production in the Early Solar System 489
W.U. Reimold, M. Tredoux, J.M. Barr, and R.A.F. Grieve:
A Geochemical Study of Lake St. Martin Melt and Basement Rocks 490
Frans J.M. Rietmeijer: Olivines and Iron-Sulfides in Chondritic
Porous Aggregate U2015*B Formed at Low-Temperature during
Annealing of Amorphous Precursor Materials 492
K.B. Reuter, D.B. Williams, and J.I. Goldstein:
The Fe-Ni Phase Diagram Below 350°C 493
K.J.R. Rosman and J.R. DeLaeter: Isotopic Fractionation
in Meteoritic Cadmium Revisited 495
M.W. Rowe, M. Hyman, D.L. Cocke, and R. Palma:
Plasma Chemistry: Application to Noble Gas Mass Spectrometry 495
Alan E. Rubin and John T. Wasson: Relationships Among Primitive
Allende Componentse: Implications for the Origin of Chondrules 496
S.K. Runcorn: Lunar Palaeomagnetism and Its Implications 497
A. Ruzicka: Pre-Agglomeration Metamorphism
of Chondrules in the Chainpur Chondrite 498
A. Ruzicka: Deformation Histories of Chondrules in the Chainpur Chondrite 499
V. Saikumar and J.I Goldstein: Numerical Model
to Determine Cooling Rates of Iron Meteorites 500
Scott A. Sandford: The Use of Solar Flare Track Densities Measured in
Interplanetary Dust Particles (IDPs) to Determine an
Asteroidal Versus Cometary Origin of the Zodiacal Dust Cloud 501
N. Schelhaas, U. Ott, and F. Begemann: Noble Gas Components
in Semarkona (LL3.0/0) and Other Unequilibrated Chondrites 503
L.S. Schramm and D.S. McKay: An Impact Crater Containing
Meteoritic Material in a Louver from the Solar Max Satellite:
A Comparison with Experimentally Produced Craters 504
Ludolf Schultz: Allende in Antarctica: Temperatures in Antarctic Meteorites 505
P.H. Schultz and D.E. Gault: Do Craters Flatten with Size? 506
Carol Schwarz, Graham Ryder, and A.V. Murali: Chemistry of
Mineral Separates from Three Antarctic Aubrites from Allan Hills 507
C.B. Sclar: Development of Cleavage in Quartz by Intraterrestrial Explosion 508
R.B. Scorzelli and J. Danon: Mössbauer Study of
Schreibersite from Bocaiuva Iron Meteorite 509
E.R.D. Scott, G.J. Taylor, K. Keil, S.G. McKinley, and I.E. Wilson:
Accretion, Metamorphism and Brecciation of Ordinary Chondrites:
Evidence from Petrologic Studies of Meteorites from Roosevelt County 509
D.M. Shaw, M.D. Higgins, and M.G. Truscott: Status of
Alpha Track Imaging of Chondrites for B/Li Distributions 510
Masako Shima: Distribution of Cosmic-Ray-Produced
^{53}Mn in a Large Iron Meteorite Trenton 511
P.P. Sipiera and Y. Kawachi: Classification of 26 Chondrites
from Roosevelt County, New Mexico 512
D.S. Sneyd, H.Y. McSween, Jr., N. Sugiura, and D.W. Strangway:
Asteroidal Deformation: Strain Analysis and
Magnetic Aniostropy in Ordinary Chondrites 513
B. Spettel, H. Palme, and A. Bischoff: A Large
Ca,Al-Rich Inclusion from the Arch (C3V)-Meteorite 513

A.H. Spitz and W.V. Boynton: The Light Rare Earth Element Host Phases in Ureilite Meteorites 515
I.M. Steele: Cathodoluminescence of Forsterite in Extraterrestrial Samples as a Genetic Indicator 517
D. Storzer and D. Müller-Sohnius: The K/Ar Age of High Sodium/Potassium Australites 518
N. Sugiura, J. Arkani-Hamed, and D.W. Strangway: Preliminary Study on Transport of Hydrogen and Water in Chondrite Parent Bodies 519
S.R. Sutton: Thermoluminescence of Lunar Meteorite Yamato-82192: Evidence for a Small Perihelion Orbit 520
T.D. SWindle, M.W. Caffee, and C.M. Hohenberg: I-Xe Studies of Individual Chondrules 521
T. Tagai, H. Takeda, and G.E. Harlow: Diffraction Characteristics and Thermal Histories of Calcic Plagioclases in Serra de Magé and Other Related Eucrites 522
Hiroshi Takeda, H. Toyoda, J.S. Delaney, and M. Prinz: A Yamato Polymict Eucrite with Some Affinities to Howardites 523
Stuart Ross Taylor: Lunar Origins and Mars-Sized Impactors 524
K. Thiel, J. Peters, W. Schröder, W. Graf, and O. Reinwarth: Spherules from Polar Ice and Earth Atmosphere: An Attempt to Characterize the Cosmic Dust Component 525
Kazushige Tomeoka and Peter R. Buseck: Mineralogical Evidence for Hydration and Oxidation of Fe-Rich Olivine in the Mokoia CV3 Meteorite Matrix 526
S. Vogt, R. Sarafin, U. Herpers, G. Bonani, M. Suter, and W. Wölfli: Depth Profiles of the Cosmogenic Radionuclides ^{10}Be and ^{26}Al in the L5 Chondrite Knyahinya 527
John F. Wacker: Trapped Noble Gases in the Low-Shock Ureilite Roosevelt County 027 528
L.S. Walter, C.C. Schnetzler, and J.G. Marsh: Search for the Australasian Tektite Source Crater 529
Daode Wang: Recent Chondrite Falls from China 530
Paul H. Warren, Gregory W. Kallemeyn, and Eric A. Jerde: Siderophile Elements in Some Peculiar Moon Rocks and Eucrites 531
Paul H. Warren and Gregory W. Kallemeyn: How Many Launching Sites Supplied the Lunar Meteorites? 532
H.W. Weber, O. Braun, and F. Begemann: A New Noble Gas Abundance Pattern in a Lunar Meteorite: Yamato 82192 533
Hou Wei, Daode Wang, Lin Wenzhu, and Chen Yongheng: Zaoyang and Zhaodong Chondrites 534
M.K. Weisberg: Barred Olivine Chondrules in Carbonaceous Chondrites 535
S.J. Wentworth and J.L. Gooding: Shergottite EETA79001: Petrologic Heterogeneity and Secondary Alteration in Lithology C 536
G.W. Wetherill: Sun-Approaching Bodies: Neither Cometary Nor Asteroidal? 537
Frans E. Wickman and J.O. Nyström: Brunflo, the First Fossil Chondrite 538
R. Wieler, Th. Graf, P. Signer, P. Pellas, C. Fieni, and M. Ghelis: Pre-Exposure of Clasts in Fayetteville's Progenitor Asteroidal Regolith 538
R.C. Wiens and R.O. Pepin: Laboratory Shock Emplacement of Low Ambient Pressure Gases Into Basalt: Relation to EETA79001 Trapped Gas . 540
C.V. Williams, E.R.D. Scott, G.J. Taylor, K. Keil, L. Schultz, and R. Wieler: Histories of Ordinary Chondrite Parent Bodies: Clues from Regolith Breccias 541

Wendy S. Wolbach, Roy S. Lewis, Edward Anders, Monica M. Grady, Colin T. Pillinger, Robert R. Brooks, Carl J. Orth, and James S. Gilmore: Carbon Isotopes and Iridium at Two Cretaceous-Tertiary (K-T) Boundary Sites in New Zealand 541
John A. Wood: Planning a Sample-Return Mission to a Comet Nucleus 542
D.S. Woolum, D.S. Burnett, T.M. Benjamin, P.S.Z. Rogers, C.J. Duffy, and C.J. Maggiore: A Test of Solar System Abundance Smoothness 543
Keizo Yanai and Hideyasu Kojima: Preliminary Studies of the Yamato-791839 Ureilite with Melt-Portion 544
Chen Yongheng and Daode Wang: Multisample Trace Element Abundances of Xinjiang Iron Meteorite 545
Lei Zhou and Frank T. Kyte: Iridium Concentration at the Permian-Triassic Boundary 546
E. Zinner, A. Fahey, K. McKeegan, J. Goswami, and T. Ireland: Large ^{48}Ca Anomalies Accompany ^{50}Ti Anomalies in CM hibonites 547
M.E. Zolensky and J.L. Gooding: Aqueous Alteration on Carbonaceous-Chondrite Parent Bodies as Inferred from Weathering of Meteorites in Antarctica 548

Remembrance of Harvey Harlow Nininger 551
Miscellanea 553